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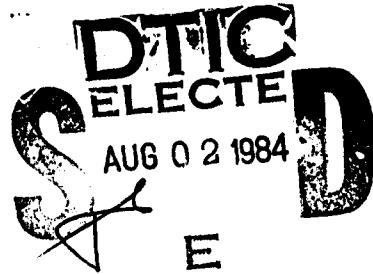


FLIGHT OPERATION MANUAL FOR THE Mi-8 HELICOPTER

by

B. Bugayev

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EDITED TRANSLATION

FTD-ID(RS)T-0320-84

11 July 1984

MICROFICHE NR: FTD-84-C-000687

FLIGHT OPERATION MANUAL FOR THE Mi-8 HELICOPTER

By: B. Buagyev

English pages; 12

Source: Rukovodstvo po Letnoy Ekspluatatsii Vertoleta
 Mi-8, Moscow, 1971, Attachment 1 to IR Nr.
 2 218-1468-82, pp. 13-16; 2 unnr

Country of origin: USSR

Translated by: Charles T. Ostertag, Jr.

Requester: FTD/WE

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	А а	А, a	Р р	Р р	Р, r
Б б	Б б	Б, b	С с	С с	С, s
В в	В в	В, v	Т т	Т т	Т, т
Г г	Г г	Г, g	У у	У у	У, u
Д д	Д д	Д, d	Ф ф	Ф ф	Ф, f
Е е	Е е	Е, е; Е, е*	Х х	Х х	Х, kh
Ж ж	Ж ж	Zh, zh	Ц ц	Ц ц	Ts, ts
З з	З з	Z, z	Ч ч	Ч ч	Ch, ch
И и	И и	I, i	Ш ш	Ш ш	Sh, sh
Й й	Й й	Y, y	Щ щ	Щ щ	Shch, shch
К к	К к	K, k	Ь ъ	Ь ъ	"
Л л	Л л	L, l	Ы ы	Ы ы	Y, y
М м	М м	M, m	Ь ъ	Ь ъ	"
Н н	Н н	N, n	Э э	Э э	E, e
О о	О о	O, o	Ю ю	Ю ю	Yu, yu
П п	П п	P, p	Я я	Я я	Ya, ya

*ye initially, after vowels, and after ъ, ъ; е elsewhere.
When written as ё in Russian, transliterate as э or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	\sinh^{-1}
cos	cos	ch	cosh	arc ch	\cosh^{-1}
tg	tan	th	tanh	arc th	\tanh^{-1}
ctg	cot	cth	coth	arc cth	\coth^{-1}
sec	sec	sch	sech	arc sch	\sech^{-1}
cosec	csc	csch	csch	arc csch	\csch^{-1}

Russian	English
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

FLIGHT OPERATION MANUAL FOR THE Mi-8 HELICOPTER

Ministry of Civil Aviation

B. Bugayev, Minister of Civil Aviation

Approved by A. Semenkov, Deputy Minister of Civil Aviation

Chapter 2. Operational Limitations

2.1. Based on meteorological conditions

2.1.1. It is permitted to operate the helicopter up to a temperature of the outside air of -50°C under conditions of low temperatures, and up to $+40^{\circ}\text{C}$ under conditions of high temperatures.

2.1.2. When carrying out flights the following minimum values are established in respect to height of the cloud cover and horizontal visibility (respectively) in meters:

[table on following page]

2.1.3. Flights under conditions of icing at night and with a temperature of the outside air below minus 12°C are forbidden.

Table 1a

Вид полетов (1)	ПВП (6)	ППП (7)		
		привод в створе ВПП или посадоч- ной системы (8)	привод не в створе ВПП (9)	по днем (10) днем по ночью (11) ночью
2) Транспорт- ные	150×2000	150×1500	300×3000	300×3000 400×4000
3) Тренировоч- ные к ним	100×1000	100×1000	300×3000	300×3000 400×4000
4) Срочные полеты для оказания экстренной медицинской помощи и аварийно- спасательных работ				
5) Тренировоч- ные к ним	100×1000	100×1000	200×2000	150×1500 300×3000
				100×1000 200×2000
				150×1500

Key: (1) Type of flights; (2) Hauling; (3) Training flights for hauling; (4) Emergency flights for rendering special medical help and emergency rescue operations; (5) Training flights for the latter; (6) PVP; (7) PPP; (8) drive in transit of VPP or landing system; (9) drive not in transit of VPP; (10) daytime; (11) at night.

2.2. Based on weights and centering.

2.2.1. Maximum take-off weight of helicopter, kg - 12,000.

2.2.2. Maximum take-off weight of helicopter with a load on the outside suspension, kg - 11,000.

2.2.3. Maximum number of passengers - 28.

2.2.4. Maximum permissible weight of transportable load inside the fuselage, kg - 4,000.

2.2.5. Maximum permissible centerings of the helicopter, mm:
in the passenger version with baggage:

forward (in front of axis of rotation of main rotor) - +370

rear (behind the axis of rotation of main rotor) - -80

in all the remaining versions:

front - +370; rear - -30.

2.3. Based on flight data and maneuverability.

2.3.1. Horizontal flight, climbing, motor gliding and gliding in the mode of autorotation of the main rotor are permitted in the following range of instrument speeds, km/h:

Table 2.

Высота полета, м	Максимально допустимая скорость		Минимально допустимая скорость
	(4) при весе не более 11100 кг	(5) при весе более 11100 кг	
(6) Выше 40 от земли			
500	250	230	60 *
1000	250	230	60
2000	215	195	60
3000	185	155	60
4000	150	120	80
4500	135	—	100

* See point 2.3.4.

Key: (1) Flight altitude, m; (2) Maximum permissible speed; (3) Minimum permissible speed; (4) with a weight of no more than 11,100 kg; (5) with a weight greater than 11,100 kg; (6) Over 40 from the ground.

2.3.2. Flights at low altitudes over terrain are permitted at instrument speeds of:

- 0-80 km/h at altitudes from 0 to 10 m;
- 60-150 km/h at altitudes from 10 to 40 m.

2.3.3. Hops and shifting of the helicopter at altitudes less than 10 m are carried out at speeds up to 20 km/h (without going into the vibration mode) with a calculation of velocity and direction of the wind.

2.3.4. In the range of altitudes of 10-200 m hovering, vertical climb and vertical descent are permitted when:

- transporting loads on external suspension;
- taking off and landing in areas which are limited by high obstacles;
- carrying out emergency rescue operations;
- rendering emergency medical aid.

2.3.5. Flights at low altitudes over strongly broken terrain (ravines, etc.) are made at altitudes of no less than 20 m above the relief of the terrain and at instrument speeds of no less than 60 km/h.

2.3.6. Maximum permissible speed of horizontal flight with the rear doors of the freight compartment half open (when transporting blades for the main rotor and other long loads) is 160 km/h instrument speed.

2.3.7. Turns and hovering are made with an angular velocity of no more than 12 deg/s (complete revolution during rotation no less than 30 s).

Rotation is terminated in no less than 3 or 5 s depending on the regulation of the maximum angle of rotation of the blades of the tail propeller, respectively 18° or 21°.

2.3.8. Turns in hovering at the ground are permitted for 360° with a wind speed of no more than 5 m/s and for 90° from the direction of a head wind with a wind speed of no more than 10 m/s.

2.3.9. Acceleration and shutdown of the main rotor, and also hovering, take-off and landing of the helicopter are permitted at the following wind speeds and directions:

Table 3

Направление ветра (1)	(2) Допустимая скорость ветра при раскрутке и остановке кесущего винта, м/сек	(3) Допустимая скорость ветра при взлете, посадке, вылете и подлетах, м/сек
4 Спереди	20	20
5 Сбоку	10	10
6 Сзади	8	8

Key: (1) Direction of wind; (2) Permissible wind speed during acceleration and shutdown of main rotor, m/s; (3) Permissible wind speed during take-off, landing, hovering and hopping, m/s; (4) From the front; (5) From the side [crossed out and an illegible entry made]; (6) From the rear.

2.3.10. Turns and hoverings are permitted in the entire range of permissible speeds:

- with a flight weight of no more than 11,100 kg, with a bank of no more than 30°;

- with a flight weight of no more than 11,100 kg and on flights with the autopilot on and on instruments, with a bank of no more than 15°.

2.3.11. Turns in the mode of autorotation of the main rotor are permitted with a bank of no more than 20°.

2.3.12. Maximum permissible revolutions of the main rotor in a time of no more than 30 s (in % on indicator) is 103% and in the mode of idling for no more than 5 s - 105%.

2.3.13. Minimum permissible revolutions of the main rotor is 89% (on the indicator).

2.3.13. [illegible]

2.3.14. When carrying forced and training landings with a short run with one and two engines not operating it is permitted at low altitude near the ground, directly before touchdown (with cutting of the pitch of the main rotor), to drop the revolutions of the main rotor to 70% on the indicator for no more than 15 s [illegible entry].

2.3.14. The altitude channel of the AP-34B autopilot is turned on in horizontal flight at an altitude of no lower than 50 m.

2.3.15. Commercial flights over water are permitted with flight weights which ensure flight without descent in the case of failure (turning off) of one of the engines and the use of the take-off mode of the operating engine. Take-off weight of the helicopter is calculated in such a manner that in the case of a hop to the edge of the water the flight weight would not exceed the magnitude of flight weight determined using the chart in Figure 38.

2.3.16. In the case of development of low-frequency vibrations of the helicopter in flight turn off the autopilot, with a smooth movement of the control elements switch the helicopter to another mode, on which these vibrations are absent, and continue flight. Balance the helicopter and turn on the autopilot.

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وَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ يَرَهُ وَمَنْ يَعْمَلْ مِثْقَالَ ذَرَّةٍ يَرَهُ

Barotri muthi / ml	النوع الجاف	النوع الماء	النوع الماء	النوع الماء
5-10	—	—	—	—
10-15	20-40	—	—	—
20-30	40	—	—	—
3-5	5	—	—	—
5-10	20-40	—	—	—
20-30	40	—	—	—
2-5	5	—	—	—
3-10	20-40	—	—	—
20-30	40	—	—	—
5-5	—	60	—	—
5-20	—	60-90	—	—
30-40	—	150	—	—

Wise 427

cap 14-15

Takusar, L		crp 14-15	
Altitude, m	Topographic S. & R.	V. max	V. min
4500 - 5000	on S. side 10000	135	80
5000 - 5500	on S. side 5500	135	80
5500 - 6000	on S. side 5000	135	80

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3.3/6 В соответствии с выше изложенным можно
выделить основные ограничения. Если при полете на высоте
20000 м сопротивление и расход топлива ограничены гидравлическими
ограничениями, то при полете на высоте 10000 м ограничениями
числа оборотов и расхода топлива являются ограничениями
максимальной температуры газа перед турбиной, максимальной температурой
и продолжительностью работы турбины. При полете на высоте 10000 м
максимальные ограничения температуры, расхода топлива и
числа оборотов изложены в таблице ниже в пределах
и соответствующей надежности, если в дальнейшем
исчезнут, ограничения становятся неактуальными.

2.4. Based on modes of operation of the power plant.

2.4.1. The maximum permissible measured parameters of operation
of the engines at all altitudes and flight speeds should be no higher
than:

Table 4

Режимы (1)	Температура газа перед турбиной компрессора, °C (не более) (2)	Число оборотов турбины компрессора, % (3)
(4) Валетный	880 (при работе на земле не выше 875)	101
(5) Номинальный	860	100
(6) Крейсерский	810	98
(7) Малый газ	600	64,0 ^{+2,0} _{-1,0}

Key: (1) Modes; (2) Temperature of gas before the compressor turbine, °C (no more than); (3) Number of revolutions of compressor turbine, %; (4) Take-off; (5) Rated; (6) Cruising; (7) Idling; (8) when operating on the ground no more than 875.

2.4.2. Guaranteed lifetime of the engine (with a calculation of 20% operation on the ground) and the main reduction gear up to the first overhaul or repair and calendar period of service are indicated in the logbooks for the engine and reduction gear.

2.4.3. Permissible time of operation of the engine and reduction gear during lifetime (in % of lifetime):

in take-off mode	- 5%
in rated mode	- 40%
in cruising mode	- without limitation
reduction gear from one engine	- 10% (5% from each).

2.4.4. Permissible time of continuous operation of the engine, no more than, min:

in take-off mode	- 6
in rated mode	- 60
in cruising mode	- without limitation
in idle	- 20.

2.4.5. Minimum permissible time between repeated passings into the take-off or rated modes after a continuously developed maximum permissible time - 5 min.

2.4.6. In the case of failure of one engine in flight the continuous operation of the other engine and main reduction gear in the take-off mode is permitted for one hour.

Caution. The engine and main reduction gear are subject to removal from the helicopter after a single use in this mode.

2.4.7. The minimum temperature of the outside air for 24 hours preceding start-up, at which it is permitted to start up without warming up:

- intermediate and tail reduction gears - 30°C
- engines, main reduction gear, bushing of the main and tail rotors and the automatic misalignment device - 40°C.

2.4.8. Maximum measured temperature of gases before the compressor turbine during start-up of the engine no higher than 600°C.

2.4.9. Permissible values of operational parameters for operation of the engines:

oil pressure, kg/cm²:

on idle - no lower than 2

in cruising, rated and take-off modes - 3.5±0.5;

oil temperature on output, °C:

minimum for start-up without warming up the engine - -40

minimum for passing to modes higher than idling - 30

minimum for prolonged operation in modes no lower than cruising

- 70

maximum - 125.

2.4.10. Mode variability of operation of the engines in steady-state modes, from cruising and higher, should not exceed in % the difference of revolutions of the turbocompressors:

- without triggering the limiters - 2%;
- without triggering the limiter of degree of increase of pressure in the turbocompressor (in revolutions, reduced to standard conditions equal to 102-104%) - 4%;
- with triggering of the limiter of temperature of gases - 3%.

During operation of the engines in modes below cruising or in nonsteady-stage modes the difference in revolutions of the turbocompressors of the engines is not regulated.

2.4.11. Permissible values of operational parameters of operation of the main reduction gear:

oil pressure, kg/cm²:

- in idling mode - no lower than 0.5,
- in flights with slipping temporarily - no less than 2.5,
- in the remaining modes - $3.5+0.5$;

oil temperature at entrance to reduction gear in all modes, °C:

- maximum - 90,
- minimum, permitting passing from idle to mode operation - -15,
- minimum permissible during prolonged operation - 30.

2.4.12. Maximum temperature of oil in the tail and intermediate reduction gears no more than 120°C.

[illegible insertions: 2.3.16 and 2.7.1.]

2.3/6 B.
1.7.1 Tipu nivellata (L.) Benth. subsp. ciliolata (L.) Benth. (syn. T. ciliolata (L.) Benth.)
Tipu nivellata (L.) Benth. subsp. ciliolata (L.) Benth. & Petiveria hypoleuca (L.) A. Nels.

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2.5. Based on dimensions of the flight strips.

2.5.1. The minimum dimensions of flight strips of permanent and temporary airfields and landing areas for take-offs and landing should be, m:

- with a short take-off run and landing run - 180x60;
- by the helicopter method with the use of the influence of an "air cushion" - 120x60;
- by the helicopter method without using the influence of the "air cushion" - 60x60.

2.5.2. The minimum dimensions of the prepared (planed) operating site of airfields and sites for take-offs and landings with a short take-off run and landing run should comprise 150x30 m, and for take-offs and landings using the helicopter method at permanent airfields - 30x30 m, and at temporary - 10x10 m; in this case the minimum width of the unprepared safety zone (with a height of obstacles no greater than 0.5 m), surrounding the operating site, should comprise 15 m.

2.5.3. The minimum dimensions of landing sites located on the tops of mountaintops, saddles and terraces with open approaches in the direction of take-off and making it possible to make take-offs and landings using the helicopter method with the influence of the "air cushion" should comprise 10x30 m. The minimum excess of such a site over the general relief of the terrain to the side of take-off should comprise 300 m, and the minimum distance of the site up to obstacles - 500 m.

2.5.4. The operating site of airfields and landing sites, intended for take-offs and landings of helicopters, should have a soil strength of no less than 3 kg/cm² and slopes no greater than 0.03 - longitudinal, 0.02 - transverse.

2.5.5. Take-off-landing [crossed out in original] platforms should have dimensions of no less than 25x20 m.

The construction of the base of the platforms (piles, stringers, beams) is calculated for a concentrated load of 24 t and checked for temporary loads, developing as a result of strong snowfall or the simultaneous presence on the platform of the helicopter, the technical personnel servicing it, passengers, loads, movable means of mechanization and loading transport.

The planking (cover) of the platform is calculated for a concentrated load of 9 t, acting on a square area with dimensions 28x28 cm.

2.6. Based on aerial approaches.

2.6.1. When ascending and approaching for a landing it is permitted to fly over obstacles with a clearance of no less than 10 m, and over aircraft and helicopters which are found on the ground, no less than 45 m [25 crossed out in original].

2.6.2. When making take-offs and landings with a short take-off and landing run or by means of the helicopter method with the use of the influence of the "air cushion," the aerial approaches of the air-field or site up to an altitude of 150 m should be open or have obstacles with a slope angle of the conditional plane of limitation of obstacles in the direction of take-off (landing) of no more than 1/10 at a distance up to 100 m from the end of the site with a length of 180 or 120 m respectively, further the slope tangent of the conditional plane should be no more than 1/8.

The slope tangent of the conditional side plane of limitation of obstacles should comprise no more than 1/2.

2.6.3. When making take-offs and landings using the helicopter method without using the influence of the "air cushion," around a site with the dimensions 60x60 m the aerial approaches can have obstacles with a maximum slope tangent of the conditional plane of limitation of obstacles in the direction of take-off (landing) no greater than 1/2 and no greater than 1/1 from the lateral sides.

2.7. With flights with a load on an external suspension.

2.7.1. The maximum take-off weight of a helicopter with a suspension (including the weight of the load on the external suspension) is 11,000 kg.

2.7.2. The maximum weight of the load, transported on an external suspension, is 2500 kg.

2.7.3. The maximum permissible flight speed of the helicopter when transporting a load on an external suspension is 250 km/h.

Warning. When operating an external suspension with the 8AT-9600-1 cable with a diameter of 13 mm (on helicopters with the plant numbers No. 1010 through No. 1012) while transporting a load with a weight more than 2000 kg the maximum flight speed is 150 km/h.

Note. The behavior of a load on an external suspension is determined mainly by its weight, aerodynamic shape and method of slinging.

Therefore the extent of the permissible flight speed in each specific case will depend on the behavior of the load during its transport on an external suspension.

2.7.4. The vertical speed of the helicopter at the moment of tightening of the suspension cable and separation of the load from the ground should not exceed 0.1 m/s.

2.7.5. Turns and hops at the ground with a load on an external suspension in the case of a take-off weight of more than 10,500 kg are prohibited.

In this case hovering and take-off with a load on the external suspension are made strictly against the wind.

2.7.6. It is permitted to switch to flight with forward speed if during hovering the distance from the load to the ground is no less than 3 m.

2.7.7. Flights ~~in-eleuds~~ with a load on an external suspension are prohibited [crossed out in original, hand-written entry illegible].

2.8. During flights in mountains.

2.8.1. Flights in mountainous terrain are made in accordance with the rules for visual flights (PVP) at safe altitudes and with horizontal visibility established by NPP GA-71 §-456-for-heliicopters-with-a-cruising-speed-less-than-200-km/h-(p-2-4-3). [crossed out in original].

2.8.2. It is permitted to make take-offs and landings at heliports and sites, including those selected from the air, located at altitudes up to 4000 m.

2.8.3. Take-off-landing operations and maneuvers at low speeds near the ground at airfields and sites, located at altitudes higher than 1000 m, are made with at least 93% revolutions of the main rotor for the purpose of ensuring reserves of pedal control in these modes.

2.8.4. The first flights to a site, selected from the air, are made with a flight load, determined in accordance with the recommendation of p. 3.1.4. of this Manual and a reduction by 300 kg; in this case the flight weight should not exceed 10,500 kg.